

1<sup>st</sup> AF-1625/17

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Louise FARRAND et al.

Confirmation No.: 6056

Serial No.: 09/654,516

Examiner: Taylor V. Oh

Filed: September 1, 2000

Group Art Unit: 1625

Title: MULTIREACTIVE POLYMERIZABLE MESOGENIC COMPOUNDS

**BRIEF ON APPEAL UNDER 37 C.F.R. § 41.37**

MAIL STOP APPEAL BRIEF-PATENTS

Commissioner for Patents

Box 1450

Alexandria, Virginia 22313-1450

Sir:

This is an appeal from the decision of the Examiner finally rejecting claims 1-10 and 17-20 of the above-identified application.

**(1) REAL PARTY IN INTEREST**

The application is assigned of record to Merck Patent Gesellschaft mit beschränkter Haftung, who is the real party in interest herein.

**(2) RELATED APPEALS AND INTERFERENCES**

Appellants, their legal representative and the assignee are not aware of any related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the instant appeal.

05/13/2005 HALI11 00000144 09654516

01 FC:1402

500.00 OP

### **(3) STATUS OF THE CLAIMS**

The status of claims indicated by the Examiner in the Advisory Action is different from that indicated in the Final Office Action. In the Final Office Action, only claims 1-2 and 6-8 were rejected and the remaining pending claims 3-5, 9, 10 and 17-20 were indicated as merely objected to as dependent on a rejected claim. In the Advisory Action, it was indicated that all of claims 1-10 and 17-20 were rejected. In order to avoid missing an issue, appellants assume for purposes of this appeal that the status is as indicated in the Advisory Action, i.e., as follows:

Claims rejected:	Claims 1-10 and 17-20.
Claims allowed:	(none)
Claims canceled:	Claims 11-16
Claims withdrawn:	(none)
Claims on Appeal:	Claims 1-10 and 17-20 (Copy of claims on appeal in attached Appendix).

### **(4) STATUS OF AMENDMENTS AFTER FINAL**

The Advisory Action mailed March 29, 2005, states that the amendments contained in the Reply After Final Rejection filed by appellants on February 3, 2005, will be entered for purposes of appeal. Thus, the amendments made there, canceling non-elected claims 11-16, should now be entered.

### **(5) SUMMARY OF CLAIMED SUBJECT MATTER**

Appellants' invention is directed to multireactive polymerizable mesogenic compounds of formula I of claim 1, on appeal, i.e.,

where the R<sup>1</sup>, MG and R<sup>2</sup> groups are as defined in the claim. See, e.g., page 6, line 5, to page 7, line 5, of the instant specification. One aspect of the compounds of the claimed invention is that the R<sup>2</sup> group "is substituted with at least two identical or different groups P." See also, page 4, lines 5-9, of the instant specification referring to this aspect as providing mesogenic compounds having "two or more polymerizable groups attached to the same side of a mesogenic core" and page 4, line 11, to page 5, line 22, for example, discussing advantages of such aspect. Dependent claims 4 and 18, on appeal, define more specifically the mesogenic group in the compounds; see, e.g., page 8, lines 1-24; and page 10, line 14, to page 11, line 6, of the instant specification. Dependent claims 5, 8, 10 and 17, on appeal, define (or depend upon claims which define) more specifically the polymerizable group, P, in the compounds; see, e.g., page 8, lines 26-29; and page 10, lines 5-7, of the instant specification. The compounds of the claimed invention are useful as monomers for preparing liquid crystal polymers which have a variety of uses well known in the liquid crystal art; see, e.g., page 1, lines 15-25; page 3, lines 6-35; and page 7, lines 16-24; of the instant specification.

#### **(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The sole ground of rejection at issue on the appeal is the rejection of claims 1-10 and 17-20, on appeal, under 35 U.S.C. §112, second paragraph. Particularly, the terms "polymerizable group" and "mesogenic group," as used in the claims on appeal, are alleged to be indefinite.

Appellants' arguments below provide separate additional arguments against the rejection as to:

- Claim 4, on appeal,

- Claims 5, 8 and 17, on appeal,
- Claim 10, on appeal, and
- Claim 18, on appeal.

## **(7) APPELLANTS' ARGUMENTS**

A. The rejection of claims 1-10 and 17-20, on appeal, under 35 U.S.C. §112, second paragraph, for allegedly being indefinite, should be reversed for at least the following reasons.

Initially, appellants would like to address the following two arguments made by the Examiner in the Advisory Action of March 29, 2005.

First, it was argued in the Advisory Action that the "mesogenic" and "polymerizable" group terms are indefinite because claim 1, on appeal, provides no chemical structural formula to exactly define such terms. Appellants respectfully submit that the use of a functional term to define a chemical group and the lack of an exact structural formula does not necessarily give rise to indefiniteness. As discussed further below, the "mesogenic" and "polymerizable" group terms are well known terms in the liquid crystal art and one of ordinary skill in the art would be able to reasonably determine the metes and bounds of these terms. The standard for definiteness is a reasonable standard, not an absolute exacting one. See, for example, In re Moore, 439 F.2d 1232, 1235, 169 USPQ 236 (CCPA 1971); and, Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1385, 231 USPQ 81, 94-95 (Fed. Cir. 1986). Thus, that the terms are not defined by an exacting formula does not necessitate that they are indefinite, as appears to be the position taken in the Advisory Action.

Second, the Advisory Action alleges that appellants are trying to claim all "mesogenic" and "polymerizable" groups, including those not yet known. This is clearly not

the case. An aspect of claim 1, on appeal, is the particular novel arrangement of the mesogenic and polymerizable groups therein. Claim 1, an appeal, defines a particular arrangement of the polymerizable and mesogenic groups therein. As pointed out above in the Summary of the Claimed Subject Matter, the R<sup>2</sup> group "is substituted with at least two identical or different groups P," which (as discussed at page 4, line 5, to page 5, line 22, of the instant specification) provides mesogenic compounds having "two or more polymerizable groups attached to the same side of a mesogenic core" and results in certain advantages due to such arrangement. The novelty of the invention does not lie in the nature of the polymerizable or mesogenic groups. Any of the polymerizable or mesogenic groups known in the art can be utilized to achieve the invention. Further, not yet discovered polymerizable or mesogenic groups should not be excluded from the claim scope. A simple analogy will hopefully illustrate appellants' position on this point. Assume someone patents a new type of doorknob whose novelty lies in its mechanics of operation and the claim recites that the doorknob is made of metal, plastic or wood. Such claim should and would protect the patentees against one using a doorknob having the same mechanics of operation but using a new type of plastic that was not invented at the time the patentees obtained their patent. The patent law properly protects a patentee in the novel feature(s) of their invention even if later invented materials – not germane to the novel feature(s) – are substituted. In the instant case, the novelty of appellants' invention of claim 1, on appeal, does not lie in the nature of the polymerizable or mesogenic groups. Instead, at least one novel aspect of the invention, is the relative arrangement of the polymerizable or mesogenic groups in the compounds. Appellants should not be barred from obtaining a patent by the fact that claim 1, on appeal, encompasses the use of all "mesogenic" and "polymerizable" groups, including those not yet known, in the novel claimed arrangement.

In view of the above discussion, appellants urge that the only proper issue to consider for 35 U.S.C. §112, second paragraph, purposes is whether one of ordinary skill in the art would know the meaning and the metes and bounds, within reason, of the terms "polymerizable group" and "mesogenic group." Appellants point out that the PTO has never made a case in this prosecution that one of ordinary skill in the art would not know the meaning and the metes and bounds of the terms "polymerizable group" and "mesogenic group." The PTO's arguments to support the rejection have been:

- the "polymerizable group" and "mesogenic group" terms are very broad,
- exact chemical structures for the terms are not provided in claim 1, on appeal, or
- the terms "reach-through" to undiscovered embodiments.

Appellants urge that none of these arguments provide a proper basis to support a rejection under 35 U.S.C. §112, second paragraph. In addition to the discussion above traversing these arguments, each will be further discussed below. But first appellants will point out the evidence of record showing that one of ordinary skill in the art would know the meaning and the metes and bounds of the terms.

The terms "polymerizable group" and "mesogenic group" are well known terms of art to one of ordinary skill in the liquid crystal materials art. Such is evidenced, for example, by the prior art, including that of record, making extensive use of these terms or terms synonymous in the art. See, e.g., the Onishi patent, U.S. Patent No. 5,750,213, at, e.g., col. 7, line 57, to col. 8, line 46 (wherein the terms "mesogen groups" and "mesogen backbone" are well known to be synonymous with "mesogenic group(s)") and the Coates patent, U.S. Patent No. 5,723,066, at, e.g., col. 7, line 61, to col. 8, line 64 (wherein the term "rod-like group" is

well known to be synonymous with "mesogenic group"). Many other patents and other literature in the liquid crystal materials art make use of these terms in the same manner.

In addition to the general knowledge in the liquid crystal materials art regarding the definition of the "polymerizable group" and "mesogenic group" terms, it was well within the routine experimentation ability of one of ordinary skill in the art to determine, for this art field, what groups would be considered polymerizable and what groups would be considered mesogenic. Accordingly, one of ordinary skill in the art could, within the framework of the reasonableness standard, use routine experimentation to determine if a particular compound falls within or outside the metes and bounds of the claims on appeal.

Although unnecessary in view of the knowledge of one of ordinary skill in the art, further guidance on the meaning of the "polymerizable group" and "mesogenic group" terms is found in the specification. Representative examples of such groups are provided by reference to the background prior art discussed at pages 1-3 of the specification, relating to polymerizable mesogenic compounds having a different arrangement than the claimed compounds, and by the groups exemplified at page 8, lines 22-25; page 15, lines 32-35; page 7, line 33, to page 8, line 20; and, page 10, line 10, to page 11, line 5; of the specification.

Appellants respectfully submit that the evidence of record shows that the terms "polymerizable group" and "mesogenic group," as used in the claims on appeal, are definite for 35 U.S.C. §112, second paragraph, purposes to one of ordinary skill in the art in the liquid crystal materials art. And the PTO has not otherwise provided evidence or convincing arguments to meet their burden of showing that the claims are indefinite under 35 U.S.C. §112, second paragraph.

Regarding the PTO's arguments alleging overbreadth of the claim, MPEP §2173.04 makes very clear that: "Breadth of a claim is not to be equated with indefiniteness. In re

Miller, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). If the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. 112, second paragraph." Although the scope of the "polymerizable group" and "mesogenic group" terms is broad, one of ordinary skill in the art would, within the reasonableness standard, know or be able to routinely determine what that scope is. The PTO has not refuted this position of appellants during the prosecution or provided any evidence to the contrary. See also MPEP §2173.02, stating: "In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. See, e.g., Solomon v. Kimberly-Clark Corp., 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000)." Even if the claims are very broad and encompass undiscovered embodiments, their scope is clear to one of ordinary skill in the art and it would be clear to others what embodiments would constitute infringement. One of ordinary skill in the art can reasonably distinguish what groups are "polymerizable" or not and what groups are "mesogenic" or not. This is all that is required under 35 U.S.C. §112, second paragraph.

Regarding the "reach-through" argument made by the PTO, appellants can find no basis in the law, case law, rules or MPEP that a claim which potentially "reaches-through" to as yet undiscovered embodiments is indefinite under 35 U.S.C. §112, second paragraph. Valid issued patent claims are full of terms which potentially cover as yet undiscovered embodiments; for example, claims containing terms such as, plastic, solvent, polymer, substrate, etc.. This does not render them indefinite or otherwise invalid. Even if a



component of the invention reads on a later-discovered embodiment, one of ordinary skill in the art would still be able to reasonably determine whether it meets or does not meet the terms of the claim. In the instant case, one of ordinary skill in this art can reasonably determine whether a group is a "polymerizable group" or a "mesogenic group", whether or not the group is a currently known one or is later discovered.

There has been some theoretical discussion by commentators regarding "reach-through claims" regarding their validity under 35 U.S.C. §112, first paragraph, and for utility. But, to the undersigned's knowledge, none of that discussion relates to supporting a 35 U.S.C. §112, second paragraph, rejection for indefiniteness on the basis that a claim term encompasses as yet undiscovered embodiments. Further, all of that discussion was made in the context of biotech-based claims and the situations unique to that technology, which is not at issue here. Accordingly, appellants do not see any applicability of the "reach-through" arguments.

The PTO has also made arguments that the claims are indefinite because they recite chemical groups which are not defined by an exact chemical structure. Appellants urge that this fact, alone, does not support an indefiniteness rejection. Obviously, the terms "polymerizable group" and "mesogenic group" are, in some respect, functional terms rather than defining an exact structure. Appellants respectfully point out that the law is well-established that claim terms are not improper merely because they are functional terms. See, e.g., In re Swinehart, 169 USPQ 226 (CCPA 1971). Appellants urge that the instant record does not provide evidence to meet the PTO's burden of supporting a 35 U.S.C. §112, second paragraph, rejection on this basis. To the contrary, appellants submit that the evidence of record shows that one of ordinary skill in the art would reasonably know or be able to

routinely determine the metes and bounds of claim 1, on appeal, and the "polymerizable group" and "mesogenic group" terms therein.

For all of the above reasons, it is urged that claims 1-10 and 17-20, on appeal, are reasonably definite to one of ordinary skill in the art and, thus, the rejection under 35 U.S.C. §112, second paragraph, should be reversed.

B. The rejection of claim 4, on appeal, under 35 U.S.C. §112, second paragraph, for allegedly being indefinite, should be reversed for the following additional reasons.

All of the arguments made in subpart A above apply to claim 4, on appeal, and it is urged that the claim is definite under 35 U.S.C. §112, second paragraph, at least for those reasons. But the following additional arguments supporting definiteness for claim 4 apply.

Claim 4, on appeal, recites a formula with specific definitions for the mesogenic group, MG, in formula I. It would appear beyond question that the "mesogenic group" term in this claim is not indefinite. In fact, in the Advisory Action, the Examiner indicated that the mesogenic group term would not be indefinite if it was defined by a chemical structure formula. Further, no case has been presented in the prosecution of the application to support an indefiniteness rejection for the narrower definition of mesogenic group in this dependent claim.

For this additional reason, it is urged that claim 4, on appeal, is reasonably definite to one of ordinary skill in the art and, thus, the rejection of this claim under 35 U.S.C. §112, second paragraph, should be reversed.

C. The rejection of claims 5, 8 and 17, on appeal, under 35 U.S.C. §112, second paragraph, for allegedly being indefinite, should be reversed for the following additional reasons.

All of the arguments made in subpart A above apply to claims 5, 8 and 17, on appeal, and it is urged that these claims are definite under 35 U.S.C. §112, second paragraph, at least for those reasons. But the following additional arguments supporting definiteness for claims 5, 8 and 17 apply.

Claim 5, on appeal, (upon which claims 8 and 17 depend) recites a formula with specific definitions for the polymerizable group, P, in formula I. It would appear beyond question that the "polymerizable group" term in this claim is not indefinite. In fact, in the Advisory Action, the Examiner indicated that the polymerizable group term would not be indefinite if it was defined by a chemical structure formula. Further, no case has been presented in the prosecution of the application to support an indefiniteness rejection for the narrower definition of polymerizable group in these dependent claims.

For this additional reason, it is urged that claims 5, 8 and 17, on appeal, are reasonably definite to one of ordinary skill in the art and, thus, the rejection of these claims under 35 U.S.C. §112, second paragraph, should be reversed.

D. The rejection of claim 10, on appeal, under 35 U.S.C. §112, second paragraph, for allegedly being indefinite, should be reversed for the following additional reasons.

All of the arguments made in subpart A above apply to claim 10, on appeal, and it is urged that the claim is definite under 35 U.S.C. §112, second paragraph, at least for those reasons. But the following additional arguments supporting definiteness for claim 10 apply.

Claim 10, on appeal, recites six specific groups for the polymerizable group, P, in formula I. It would appear beyond question that the "polymerizable group" term in this claim is not indefinite. In fact, in the Advisory Action, the Examiner indicated that the polymerizable group term would not be indefinite if it was defined by a chemical structure formula. Further, no case has been presented in the prosecution of the application to support an indefiniteness rejection for the narrower definition of polymerizable group in this dependent claim.

For this additional reason, it is urged that claim 10, on appeal, is reasonably definite to one of ordinary skill in the art and, thus, the rejection of this claim under 35 U.S.C. §112, second paragraph, should be reversed.

E. The rejection of claim 18, on appeal, under 35 U.S.C. §112, second paragraph, for allegedly being indefinite, should be reversed for the following additional reasons.

All of the arguments made in subpart A above apply to claim 18, on appeal, and it is urged that the claim is definite under 35 U.S.C. §112, second paragraph, at least for those reasons. But the following additional arguments supporting definiteness for claim 18 apply.

Claim 18, on appeal, recites several alternative formulae with specific definitions of the variables therein for the mesogenic group, MG, in formula I. It would appear beyond question that the "mesogenic group" term in this claim is not indefinite. In fact, in the Advisory Action, the Examiner indicated that the mesogenic group term would not be indefinite if it was defined by a chemical structure formula. Further, no case has been presented in the prosecution of the application to support an indefiniteness rejection for the narrower definition of mesogenic group in this dependent claim.

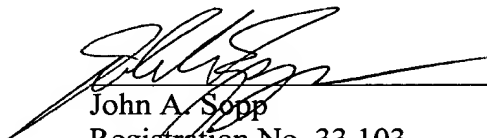
For this additional reason, it is urged that claim 18, on appeal, is reasonably definite to one of ordinary skill in the art and, thus, the rejection of this claim under 35 U.S.C. §112, second paragraph, should be reversed.

**(8) CONCLUSION**

For all of the above reasons, it is urged that the decision of the Examiner rejecting claims 1-10 and 17-20, on appeal, is in error and should be reversed.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

  
\_\_\_\_\_  
John A. Sopp  
Registration No. 33,103  
Attorney for Applicants

MILLEN, WHITE, ZELANO  
& BRANIGAN, P.C.  
Arlington Courthouse Plaza I  
2200 Clarendon Blvd. Suite 1400  
Arlington, Virginia 22201  
Telephone: (703)243-6333  
Facsimile: (703) 243-6410  
Attorney Docket No.: MERCK-2155

Date: May 12, 2005

## APPENDIX OF CLAIMS ON APPEAL

1. A multireactive polymerizable mesogenic compound of formula I



wherein

$\text{R}^1$  is halogen, CN, OCN, NCS,  $\text{NO}_2$  or an alkyl radical with 1 to 30 C atoms which may be unsubstituted, mono- or polysubstituted by halogen or CN, optionally one or more non-adjacent  $\text{CH}_2$  groups being replaced, in each case independently from one another, by -O-, -S-, -NH-, -N( $\text{CH}_3$ )-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C $\equiv$ C- in such a manner that oxygen atoms are not linked directly to one another, or alternatively has one of the meanings of  $\text{R}^2$  or is  $\text{P}-(\text{Sp-X})_n$ ,

P is a polymerizable group,

Sp is a spacer group with 1 to 25 C atoms,

X is -O-, -S-, -CO-, -COO-, -OCO-, -OCO-O-, -CO-NH-,  
-NH-CO-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CH=CH-COO-,  
-OOC-CH=CH- or a single bond,

n is 0 or 1,

MG is a mesogenic group, and

$\text{R}^2$  is straight-chain or branched alkyl with 1 to 25 C atoms which may be unsubstituted, mono- or polysubstituted by halogen or CN, optionally one or more non-adjacent  $\text{CH}_2$  groups being replaced, in each case independently from one another, by -O-, -S-, -NH-, -N( $\text{CH}_3$ )-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C $\equiv$ C- in such a manner that oxygen atoms are not linked directly to one another, and which is substituted with at least two identical or different groups P.

2. A multireactive polymerizable mesogenic compound according to claim 1, wherein  $R^1$  is not a polymerizable group.

3. A multireactive polymerizable mesogenic compound according to claim 1, wherein  $R^1$  has one of the meanings of  $R^2$ .

4. A multireactive polymerizable mesogenic compound according to claim 1, wherein MG is of formula II



wherein

Z is -O-, -S-, -CO-, -COO-, -OCO-, -CO-NH-, -NH-CO-,  
-CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CH=CH-,  
-CH=CH-COO-, -OCO-CH=CH-, -C≡C- or a single bond,

$A^1$  and  $A^2$  are each independently 1,4-phenylene in which, in addition, one or more CH groups are optionally replaced by N; 1,4-cyclohexylene in which, in addition, one or two non-adjacent CH<sub>2</sub> groups are optionally replaced by O and/or S; 1,4-cyclohexenylene; 1,4-bicyclo(2,2,2)octylene; piperidine-1,4-diyl; naphthalene-2,6-diyl; decahydronaphthalene-2,6-diyl; or 1,2,3,4-tetrahydro-naphthalene-2,6-diyl; all these groups optionally being unsubstituted, mono- or polysubstituted with F, Cl, OH, CN, NO<sub>2</sub> or alkyl, alkoxy, alkylcarbonyl or alkoxy carbonyl groups having 1 to 7 C atoms wherein one or more H atoms may be substituted by F or Cl, and

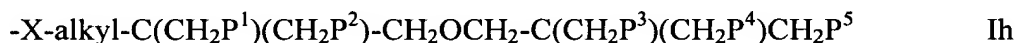
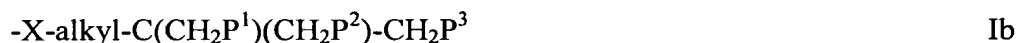
m is 1, 2 or 3.

5. A multireactive polymerizable mesogenic compound according to claim 1, wherein P is selected from  $\text{CH}_2=\text{CW}-\text{COO}-$ ,  $\text{WCH}=\text{CH}-\text{O}-$ ,  $\text{CH}_2=\text{CH}-\text{Phenyl}-(\text{O})_k-$  and



6. A multireactive polymerizable mesogenic compound according to claim 1, wherein  $\text{R}^2$  is substituted with 2, 3, 4 or 5 identical or different polymerizable groups P.

7. A multireactive polymerizable mesogenic compound according to claim 1, wherein  $\text{R}^2$  is a group of one of the following formulae



wherein

alkyl is straight-chain or branched alkylene with 1 to 12 C atoms which may be unsubstituted, mono- or polysubstituted by halogen or CN, one or more non-adjacent  $\text{CH}_2$  groups optionally being replaced, in each case



independently from one another, by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-,  
-COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in  
such a manner that oxygen atoms are not linked directly to one  
another,

a and b are identical or different integers from 0 to 6,

X has one of the meanings given in formula I, and

P<sup>1</sup> to P<sup>5</sup> independently have one of the meanings of P given in formula I.

8. A multireactive polymerizable mesogenic compound according to claim 5, wherein

R<sup>2</sup> is a group of one of the following formulae

-X-alkyl-CHP<sup>1</sup>-CH<sub>2</sub>-CH<sub>2</sub>P<sup>2</sup> Ia

-X-alkyl-C(CH<sub>2</sub>P<sup>1</sup>)(CH<sub>2</sub>P<sup>2</sup>)-CH<sub>2</sub>P<sup>3</sup> Ib

-X-alkyl-CHP<sup>1</sup>CHP<sup>2</sup>-CH<sub>2</sub>P<sup>3</sup> Ic

-X-alkyl-C(CH<sub>2</sub>P<sup>1</sup>)(CH<sub>2</sub>P<sup>2</sup>)-C<sub>a</sub>H<sub>2a+1</sub> Id

-X-alkyl-CHP<sup>1</sup>-CH<sub>2</sub>P<sup>2</sup> Ie

-X-alkyl-CHP<sup>1</sup>P<sup>2</sup> If

-X-alkyl-CP<sup>1</sup>P<sup>2</sup>-C<sub>a</sub>H<sub>2a+1</sub> Ig

-X-alkyl-C(CH<sub>2</sub>P<sup>1</sup>)(CH<sub>2</sub>P<sup>2</sup>)-CH<sub>2</sub>OCH<sub>2</sub>-C(CH<sub>2</sub>P<sup>3</sup>)(CH<sub>2</sub>P<sup>4</sup>)CH<sub>2</sub>P<sup>5</sup> Ih

-X-alkyl-CH((CH<sub>2</sub>)<sub>a</sub>P<sup>1</sup>)((CH<sub>2</sub>)<sub>b</sub>P<sup>2</sup>) Ii

-X-alkyl-CHP<sup>1</sup>CHP<sup>2</sup>-C<sub>a</sub>H<sub>2a+1</sub> Ik

wherein

alkyl is straight-chain or branched alkylene with 1 to 12 C atoms which may  
be unsubstituted, mono- or polysubstituted by halogen or CN, one or  
more non-adjacent CH<sub>2</sub> groups optionally being replaced, in each case

independently from one another, by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-,  
-COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in  
such a manner that oxygen atoms are not linked directly to one  
another,

a and b are identical or different integers from 0 to 6,

X has one of the meanings given in formula I, and

P<sup>1</sup> to P<sup>5</sup> independently have one of the meanings of P given in formula I.

9. A multireactive polymerizable mesogenic compound according to claim 7, wherein  
alkyl is -(CH<sub>2</sub>)<sub>c</sub>-, with c being an integer from 1 to 12.

10. A multireactive polymerizable mesogenic compound according to claim 1, wherein  
each P is independently of each other acrylate, methacrylate, vinyl, vinyloxy, epoxy or  
p-vinylphenyloxy.

17. A multireactive polymerizable mesogenic compound according to claim 8, wherein  
alkyl is -(CH<sub>2</sub>)<sub>c</sub>-, with c being an integer from 1 to 12.

18. A multireactive polymerizable mesogenic compound according to claim 1, wherein  
MG is a group of one of the following formulae II-1 to II-25 or a mirror image thereof:

-Phe-Z-Phe-	II-1
-Phe-Z-Cyc-	II-2
-Cyc-Z-Cyc-	II-3
-PheL-Z-Phe-	II-4
-PheL-Z-Cyc-	II-5
-PheL-Z-PheL-	II-6

-Phe-Z-Phe-Z-Phe-	II-7
-Phe-Z-Phe-Z-Cyc-	II-8
-Phe-Z-Cyc-Z-Phe-	II-9
-Cyc-Z-Phe-Z-Cyc-	II-10
-Phe-Z-Cyc-Z-Cyc-	II-11
-Cyc-Z-Cyc-Z-Cyc-	II-12
-Phe-Z-Phe-Z-PheL-	II-13
-Phe-Z-PheL-Z-Phe-	II-14
-PheL-Z-Phe-Z-Phe-	II-15
-PheL-Z-Phe-Z-PheL-	II-16
-PheL-Z-PheL-Z-Phe-	II-17
-PheL-Z-PheL-Z-PheL-	II-18
-Phe-Z-PheL-Z-Cyc-	II-19
-Phe-Z-Cyc-Z-PheL-	II-20
-Cyc-Z-Phe-Z-PheL-	II-21
-PheL-Z-Cyc-Z-PheL-	II-22
-PheL-Z-PheL-Z-Cyc-	II-23
-PheL-Z-Cyc-Z-Cyc-	II-24
-Cyc-Z-PheL-Z-Cyc-	II-25

wherein Phe is 1,4-phenylene, PheL is a 1,4-phenylene group which is substituted by 1 to 4 groups L, with L being F, Cl, CN, OH, NO<sub>2</sub> or an optionally fluorinated alkyl, alkoxy or alkanoyl group with 1 to 7 C atoms, Cyc is 1,4-cyclohexylene and Z are independently -O-, -S-, -CO-, -COO-, -OCO-, -CO-NH-, -NH-CO-, -CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -SCH<sub>2</sub>-, -CH<sub>2</sub>S-, -CH=CH-, -CH=CH-COO-, -OCO-CH=CH-, -C≡C- or a single bond.

**19.** A multireactive polymerizable mesogenic compound according to claim 1, wherein Sp is a linear or branched alkylene group having 1 to 20 C atoms, in which one or more non-adjacent CH<sub>2</sub> groups are optionally replaced by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -O-CO-, -S-CO-, -O-COO-, -CO-S-, -CO-O-, -CH(halogen)-, -CH(CN)-, -CH=CH- or -C≡C-.

**20.** A multireactive polymerizable mesogenic compound according to claim 1, wherein R<sup>1</sup> is a chiral alkyl radical with 1 to 30 C atoms which may be unsubstituted, mono- or polysubstituted by halogen or CN, optionally one or more non-adjacent CH<sub>2</sub> groups being replaced, in each case independently from one another, by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a manner that oxygen atoms are not linked directly to one another.

## **EVIDENCE APPENDIX**

Onishi patent, U.S. Patent No. 5,750,213 - made of record by the Examiner by initialing (on February 1, 2003) appellants PTO-1449 form submitted with their Information Disclosure Statement filed December 1, 2000. A copy of the initialed form is attached to the Office Action mailed February 11, 2003. A copy of the patent is attached hereto.

Coates patent, U.S. Patent No. 5,723,066 - made of record by the Examiner by the PTO-892 form attached to the Office Action mailed April 7, 2004. A copy of the patent is attached hereto.